

Lot 2: Specification for DC System

DC SYSTEM

DC equipments shall comply with IEC 60896 including those standards referred to therein.

Battery

Sr. No.	Description	Unit	Particulars
1	Type	-	VRLA
2	Nominal working voltage/Rated voltage of the battery	V	110 V DC
3	Capacity	Ah	200
4	Allowable variation in voltage	V	110V \pm 10%

The Battery capacity is indicative and minimum requirement. If higher capacity is required then same shall be without additional cost to BPC. This shall apply not only to the battery but also to all the items required for the DC system.

Battery Charger and DCDB

Sr. No.	Description	Unit	Particulars
Battery Charger Details:			
1	Rated voltage	V	415V, 3 phase, 50Hz
2	Maximum charging current		
a)	Float charging	A	40
b)	Boost charging	A	60
DCDB Details:			
3	No. of Incoming feeder of DCDB	Nos	1 nos 125 A, 2P MCCB
4	No. of outgoing feeder of DCDB	Nos.	6 nos 32 A 2P MCB, 2 nos 16 Amps 2P MCB



Requirements

Following items shall be covered in the Contract:

- a) One no. VRLA type Battery set
- b) One no. Float-cum-boost chargers for battery
- c) DC distribution board.

Battery voltage shall be 110 V DC.

All connections between battery, battery chargers and DC distribution board shall be designed for effective segregation between positive and negative leads.

Constructional Features

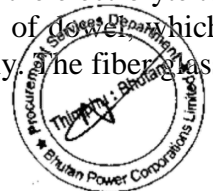
The valve regulated lead acid battery shall consist of alloyed positive plate and heavy durable negative plates, which shall conform to not less than requirements given in IS: 1651. It should be fully sealed and explosion proof. The grid of the positive plate shall be of cast type and shall resist the “foaming action” of the current during charge and discharge and retain their strength, rigidity, shape and dimensions over the operating life of the plates. The negative plates shall be designed to match the life of the positive plates. The combination of the above positive and negative plates shall ensure long life, durability, trouble free operation of the battery banks during service life of not less than twenty years when operated in float charge mode.

Each cell of battery shall be sealed and the oxygen gas generated at the positive plate shall be reduced at the negative plate surface. Thus hydrogen gas will get reconverted into water and therefore no evaporation of water shall occur. The positive grid should be deep discharge performance and negative grid of lead-calcium alloy.

The composition of the active materials shall be such that appreciable quantities of injurious or inert materials shall not be freed into the electrolyte at any time during the life- time of the battery.

Plate connections and terminal lugs: The lugs of plates of like polarity shall be connected by lead to a horizontal strap having an upstanding terminal post adopted for connection to the external circuit. The strap and post shall be cast from lead antimony alloy or lead terminal with solid copper core and shall be of ample section of enough strength and current carrying capacity. The terminal lugs shall be connected to terminal bars or alternatively form an integral portion thereof. There shall be suitable identification marks on the cell lids to identify the terminals. The connectors shall be of heavy-duty lead plated copper conductors.

Separators: The insulation between the plates shall be provided by the use of separators. They shall consist of durable diaphragm forming a spun glass micro porous matrix but complete sheet between each plate and neighboring plates and covering the whole area of the body of the plates and shall allow the electrolyte to permeate freely. The diaphragm shall be carried on slotted rods of (10mm dia) which shall be of such thickness to support and separate the plates firmly.



separators shall be unaffected by the chemical action inside the cell and shall last for an indefinitely long time. The internal resistance factor of the separator shall assume excellent high discharge characteristics under all operating conditions.

The containers shall be of high quality made of polypropylene co-polymer and free from flaws and of sturdy construction. The container shall be fully sealed with a similar material.

The element shall be supported in the cell either by upstanding ribs on the bottom of the container or from the cell cover, leaving sufficient space below the plates to accommodate any sediment which may be deposited without coming into contact with the lower edges of the plates and thus causing a short circuit.

The battery shall be protected with a low operating pressure; self-resealing type, pressure regulating and explosion proof safety valve.

The battery shall be provided with adequate sealing of highest quality and hermetically sealed, so that the battery integrity is maintained throughout the battery life.

Connectors to suit the pitch of the cell shall be supplied. Connectors may be supplied either as separate bars or alternatively as part of the cell structure i.e. as suitably elongated group bars or terminal lugs. The connectors shall be lead plated copper.

The connecting bolts nuts and washers shall be of lead plated brass. When in position and tightened up, no metal except lead shall be exposed.

The contractor shall furnish all characteristics curves for satisfactory operation and maintenance of batteries under service conditions.

The following information shall be indelibly marked on the outside of the cell or battery

- a) Cell number
- b) Type of positive plate
- c) AH (Ampere-hour) capacity at 10 hours rate
- d) Manufacturers name and country of manufacture
- e) Year and month of manufacturer

Accessories

Each battery shall be complete with following accessories:

- a) Set of inter-cell, inter-tier and inter-bank connectors required for the complete installation.
- b) Accessories for testing and maintenance:
 - i) One number -3.0 - + 3V DC Voltmeter with leads and spikes for measuring cell voltage
 - ii) A MCCB with an alarm contact of sufficient rating through which the connection to the DC switchboard/charger shall be made



- iii) Adequate quantity of acid proof two core copper cable for connection to the switchboard. / Charger panel.
- c) Any other accessories recommended by manufacturer.

Battery Charger

The float-cum-boost type battery charger shall comprise silicon controlled rectifiers (SCRs) connected in a full wave bridge circuit.

Each battery charger shall be suitable for float charging the battery under normal conditions and boost charging the battery when it has discharged during service conditions. The changeover from float to boost mode and vice versa shall be automatic.

The rectifier transformer shall be dry type and double wound with required number of taps.

The charger shall be designed to have voltage regulation of 1% and ripple content in the rectified DC supply of less than 2%. Boost charging time for charging the battery to full capacity from fully discharged condition shall not exceed 8 hours.

In the float charging mode, the charger shall be designed for supplying:

- a) The DC loads of control, indication and annunciation circuits that remain energized during normal operation and the momentary closing and trip coil loads of circuit breakers, and
- b) The float charging current of the battery.

Battery charging equipment complete with all accessories shall be housed in a free standing sheet steel cubicle having degree of protection of IP 42. Sheet steel used for construction shall be 2 mm thick. The units shall be wired using 650/1100V grade, PVC insulated, stranded copper conductor cables.

Each battery charger shall be provided with accessories that include, but not limited to the following:

- a) Silicon controlled rectifiers connected in full wave bridge circuit with ripple control devices and transient suppression network.
- b) Double wound dry type transformer with taps
- c) Automatic voltage regulator unit with manual / auto control switch
- d) Selector switch for mode of charging i.e. float charging / boost charging
- e) Off-load tap changing switch for changing the taps of the transformer
- f) DC voltmeter with fuses and a three position selector switch (digital)
- g) DC ammeter with shunt (digital)
- h) AC ammeter with selector switch for incoming AC power (digital)
- i) AC voltmeter with selector switch for incoming AC power (digital)
- j) MCB for incoming AC supply along with surge suppressers
- k) Switch-fuse / MCB on DC output side with kick fuses and alarm contacts
- l) Voltage dropping diodes in load circuit during boost charging mode
- m) DC under-voltage relay and earth fault relay
- n) AC / DC switching relays for alarm and indication circuits including buzzer



- o) Cubicle space heater suitable for 230 V AC, 1 ph, 50 Hz supply, with MCB and thermostat
- p) 230 V AC compact fluorescent lamp fixture for internal lighting with MCB

Battery charger shall be provided with the following alarms / indications:

- a) AC and DC supply 'ON'
- b) AC and DC supply fail
- c) Modes of charging
- d) Over voltage
- e) Under voltage on DC side
- f) AC / DC MCB trip
- h) Rectifier fuse blown

DC Distribution board (DB)

The distribution board manufacturing shall be CNC based and DB shall be of floor mounted design. Entry for incoming and outgoing cables shall be from the bottom. Busbars shall be of copper. Minimum thickness of DCDB shall be 2 mm with degree of protection IP42.

Incomers and outgoing circuits shall be controlled by suitably rated double pole MCBs type suitable for DC application.

Constructional features, pre-treatment, painting and other aspects shall comply with the specifications covered elsewhere. Box type hinges shall be provided for all door hinges.

An earth busbar of 25 x 3 mm copper flat shall be provided along the length of the DB at the bottom. Two nos. earthing terminals shall be provided on the external face of the board for connection to the earthing grid.

Indicating lamp shall be cluster LED type of 22 mm. diameter.

Digital Ammeter and Voltmeter shall be provided.

Tests

The batteries, chargers and distribution boards and their components shall be subjected to tests as per the applicable standards.

Certificates of type tests carried out on similar equipment shall be furnished during detail engineering.

